

***DIAGNOSING CAUSES OF CLOUD PARAMETERIZATION DEFICIENCIES USING
ARM MEASUREMENTS OVER SGP SITE***

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For presentation at
the First Science Team Meeting of
the Atmospheric System Research (ASR) Program,
Bethesda, MD
March 15-19, 2010

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ABSTRACT

Decade-long continuous surface-based measurements at Great Southern Plains (SGP) collected by the US Department of Energy's Atmospheric Radiation Measurement (ARM) Climate Research Facility are first used to evaluate the three major reanalyses (i.e., ERA-Interim, NCEP/NCAR Reanalysis I and NCEP/DOE Reanalysis II) to identify model biases in simulating surface shortwave cloud forcing and total cloud fraction. The results show large systematic lower biases in the modeled surface shortwave cloud forcing and cloud fraction from all the three reanalysis datasets. Then we focus on diagnosing the causes of these model biases using the Active Remote Sensing of Clouds (ARSCL) products (e.g., vertical distribution of cloud fraction, cloud-base and cloud-top heights, and cloud optical depth) and meteorological measurements (temperature, humidity and stability). Efforts are made to couple cloud properties with boundary processes in the diagnosis.